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# PENICILLIUM AVELLANEUM, A NEW ASCUS-PRODUCING SPECIES<sup>1</sup>

CHARLES THOM AND G. W. TURESSON

Ascus production by species of *Penicillium* is not common. The observations of certain species by Brefeld,<sup>2</sup> Morini<sup>3</sup> and Westling<sup>4</sup> have never been repeated by other workers, some of whom have watched thousands of cultures in the hope of finding one of these forms. On the other hand, *P. luteum* Zukal<sup>5</sup> is a member of a widely distributed group,<sup>6</sup> some members of which have been found repeatedly, while the ascus-producing form is not uncommon. Ascus production in this species is not dependent upon special methods of culture. Another species has now been found by one of us (Turesson) in cultures from the faeces of a bear in the Zoological Garden, at Seattle, Washington. In this form as in *P. luteum*, the asci are produced in almost all of the media regularly used. The time required varies from six weeks to perhaps three months. Its morphology relates it to *P. luteum* and to the ascus-producing forms of *Aspergillus*.

**Penicillium avellaneum** sp. nov. Thom & Turesson. Colonies upon Czapek's solution agar, broadly spreading, slightly floccose, in conidial areas becoming persistently avellaneous (Ridgeway XL, 17''' 6), producing perithecia slowly during a period of several weeks with the gradual development of aerial hyphae colored Indian-red in the perithecial areas; reverse and agar becoming Indian-red (Ridgway XXVII, 3'' K); conidiophores up to 400  $\mu$  long by 3 to 5  $\mu$  in diameter, bearing conidial fructifications up to

<sup>1</sup> Published by permission of the Secretary of Agriculture.

<sup>2</sup> Brefeld, O. Bot. Unters, über Schimmelpilze, Heft 2. 1874.

<sup>3</sup> Morini, Fausto. Sulla forma ascofora de *Penicillium candidum*, Link. Malpighia, anno 2. fascicule 5/6 pp. 224-234. Messina, 1888.

<sup>4</sup> Westling, R. Svensk Botanisk Tidskrift, Bd. 4 (1910), Heft 2, pp. 139-144.

<sup>5</sup> Zukal. Sitz. d. Kais. Akad. d. Wissensch. in Wien, Math. Naturw. Cl., XC VIII, p. 561, 1889.

<sup>6</sup> Thom. C. The *Penicillium luteum-purpurogenum* group, MYCOLOGIA, Vol. VII (1915), no. 3, pp. 134-142.

200  $\mu$  long, composed of loosely parallel or tangled chains of conidia; fertile branches either a terminal crowded verticil of metulae 8–10 by 3  $\mu$  bearing verticils of few sterigmata 8–9  $\times$  2  $\mu$ , or with branches more or less irregularly disposed over the terminal 10–15  $\mu$  of the conidiophore; conidia ellipsoid to almost globose, 2–2.5  $\times$  3–3.5  $\mu$ , smooth, swelling in germination to 5  $\mu$  in diameter and producing a single tube.

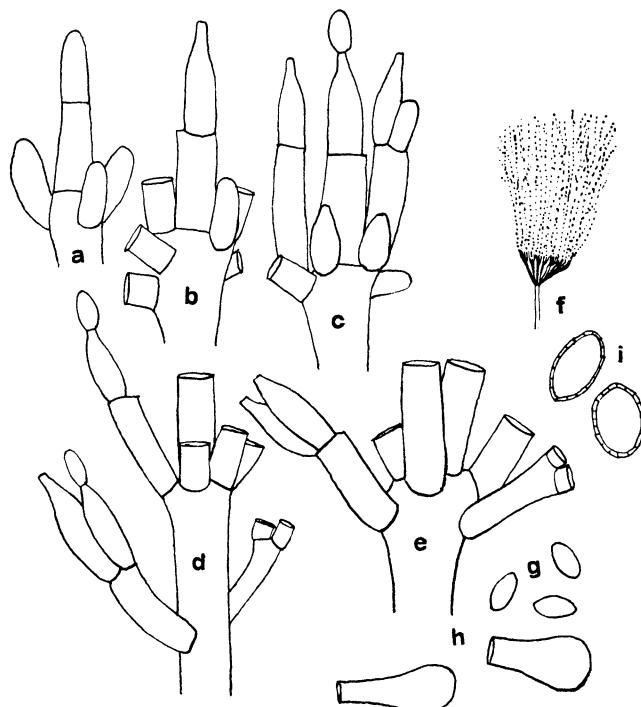


FIG. 1. *a, b, c*, Young conidial apparatus showing variation in branching; *d*, an occasional case of superposed verticils; *e*, a typical single verticillate fruit; *f*, diagrammatic representation of whole conidial fructification; *g*, conidia; *h*, conidia swollen and each producing one germ tube; *i*, ascospores with thick walls apparently fitted; magnification *a, b, c, d, e, g, h, i*,  $\times 900$ ; *f*,  $\times 260$ .

Perithecia ellipsoid to globose 300–600  $\mu$  in diameter, originating as an ascigerous mass surrounded by numerous swollen, very thick-walled cells, with the slow development of a peridium composed of thick-walled cells, 8–12  $\mu$  in diameter in one or sometimes two layers; asci 9–10  $\times$  12–15  $\mu$ , 6–8-spored; ascospores ellipsoid, 4–5  $\times$  6.5–8.5  $\mu$ , with walls thick, pitted or with the appearance of round, transparent spots.

## CULTURAL DATA

*Potato agar*, good growth, characteristic spreading pink-yellowish colonies.

*Potato plugs*, rapid and vigorous growth of almost colorless mycelium.

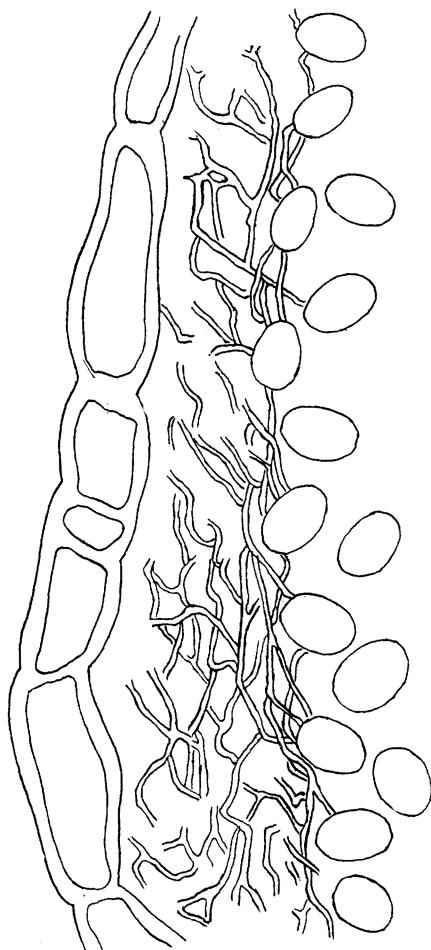


FIG. 2. Wall of perithecium.

*Bean agar*, feeble growth, floccose yellowish mycelium.

*Czapek's solution agar* (no nitrogen added), solidified with agar; carbon supplied as:

*Cane Sugar*, good growth up to 50 per cent. In 60 per cent. feeble, slowly reaching normal proportions.

*Galactose 3 per cent.*, vigorous growth of characteristic colonies.

*Lactose 3 per cent.*, as in galactose, *Levulose 3 per cent.* not vigorous.

*Glycerin 3 per cent.*, fairly good growth; *potato starch*, fair growth.

*Butterfat*, growth slow; *lactic acid 0.9 per cent.* poor growth.

*Fifteen per cent. gelatine in water*, good growth, liquefaction beginning within 48 hours at 37° C.; at 27° C. within 3 days, at room temperature after 5 or 6 days.

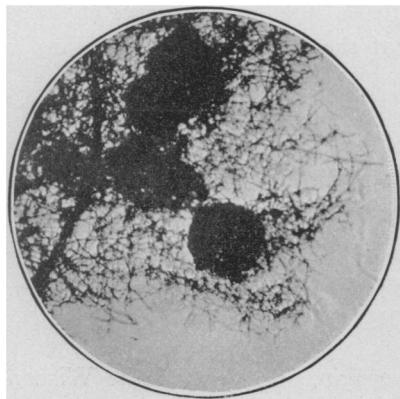


FIG 3. Microphotograph of perithecia by J. Westerberg.

*Milk*, good growth; curdling beginning on the third day at 37° C.; on the fourth day at 27° C.; on the sixth or seventh at room temperature.

*Pigment formation* in cultures kept at 27° C. begun on the seventh day in *butterfat* and *potato starch*, slight in the other media. None in *bean agar* at the end of six weeks. At room temperature coloration begun on the tenth day, maximum in *butterfat*; none in *bean agar* at the end of six weeks.

Slow growth at room temperature; fairly good at 27° C.; optimum at 36–38° C.; germination and growth feeble at 42° C.